

## What is Claimed is:

5 1. A semiconductor device for detecting a neutron comprising:  
a semiconductor substrate; and  
a boron containing layer containing isotope  $^{10}\text{B}$ , the layer being  
formed on said semiconductor substrate.

10 2. A semiconductor device according to claim 1, further  
comprising a PN junction formed on a surface area of said semiconductor  
substrate below said boron containing layer; wherein  
an electron - positive hole pair are generated in a depletion  
layer of said PN junction by  $\alpha$  ray generated by a reaction between said  
neutron and said isotope  $^{10}\text{B}$ ; and  
15 the neutrons is detected on the basis of the quantity of electric  
charge of the electron- positive hole pairs.

20 3. A semiconductor device according to claim 2, further  
comprising an analyzing circuit portion including a predetermined  
semiconductor element on said semiconductor substrate in a region other  
than the region where said neutron is detected.

25 4. A semiconductor device according to claim 3, wherein the  
concentration of said isotope  $^{10}\text{B}$  in said boron containing layer in  
said analyzing circuit portion is lower than that of said isotope  $^{10}\text{B}$   
of said boron containing layer in the region where said neutron is  
detected.

30 5. A semiconductor device according to claim 3, wherein no boron  
containing layer is provided on said analyzing circuit portion.

6. A method for fabricating a semiconductor device for detecting

a neutron comprising the steps of :

doping a predetermined impurity into a first region on a semiconductor substrate to form a PN junction on a surface region of said semiconductor substrate;

5 forming an analyzing circuit section in a second region of said semiconductor substrate for analyzing detected neutron; and

forming a boron containing layer that contains an isotope <sup>10</sup> B that reacts with said neutron to generate an  $\alpha$  ray on said semiconductor substrate in at least said first region.

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7. A method for fabricating a semiconductor device according to claim 6, wherein said boron containing layer is formed on said semiconductor substrate in said first and second regions, and

15 said concentration of said isotope <sup>10</sup> B in said second region is lower than that of said isotope <sup>10</sup> B in the first region.

8. A method for fabricating a semiconductor device according to claim 6, wherein said boron containing layer is formed only on said semiconductor substrate in said first region.

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